

撰写Hypotheses

存在的问题

- hypothesis有哪些种类? | [找相关论文看看\(DONE\)](#)
 - 一些 hypotheses 的样例
 - "Affective Color in Visualization"

H2. Affect will have a significant effect on lightness: Calm colors will be lighter, Negative ones darker.

H4. Higher weighted palettes would be more likely to be rated Best than low weighted palettes;
 - "Graphical Perception of Continuous Quantitative Maps"

H1—We expect colormaps comprising large hue variations to be perceived more accurately in scalar fields containing low spatial frequency. Conversely, we expect ramps with monotonically increasing luminance to yield higher accuracy in high-frequency data...
 - "Empirical Analysis of the Subjective Impressions and Objective Measures of Domain Scientists ' Visual Analytic Judgments"

H1a) Overall, participants will report a greater level of accuracy with slope plots.

H1b) Tasks A and C will result in greater differences in performance than Task B due to the greater complexity of these tasks

H1c) Longer domain experience and greater familiarity with particular visualizations will lead to more accurate performance.
 - "Using Animation to Alleviate Overdraw in Multiclass Scatterplot Matrices"

Hypothesis 1: Participants will identify targeted density more accurately using an animated vs. static SPLOM.
 - low/mid/high-level perception的分类
 - "Quality Metrics for Information Visualization"
 - visual encoding (position, length, area, color) 属于low-level
 - 大部分pattern相关的感知 (correlation, cluster, outlier) 属于mid-level
 - 密度没有明确说在哪一层, 心理学上似乎分类在low-level
 - [寻找其他相关文章](#)

- 关于 $H2$ 和 $H3$, 是否有必要引入marker size?
 - 有必要, 与场景(缩放)直接相关
 - 引入了更多变量, 目前有 $\text{scale} \times \Delta\text{marker size}(\text{ratio}) \times \text{density}$
 - $\Delta\text{marker size}(\text{ratio})$ 是否合理? | 做预实验 / 更改实验设计
 - density 是否必要? 或者不同任务不一样?

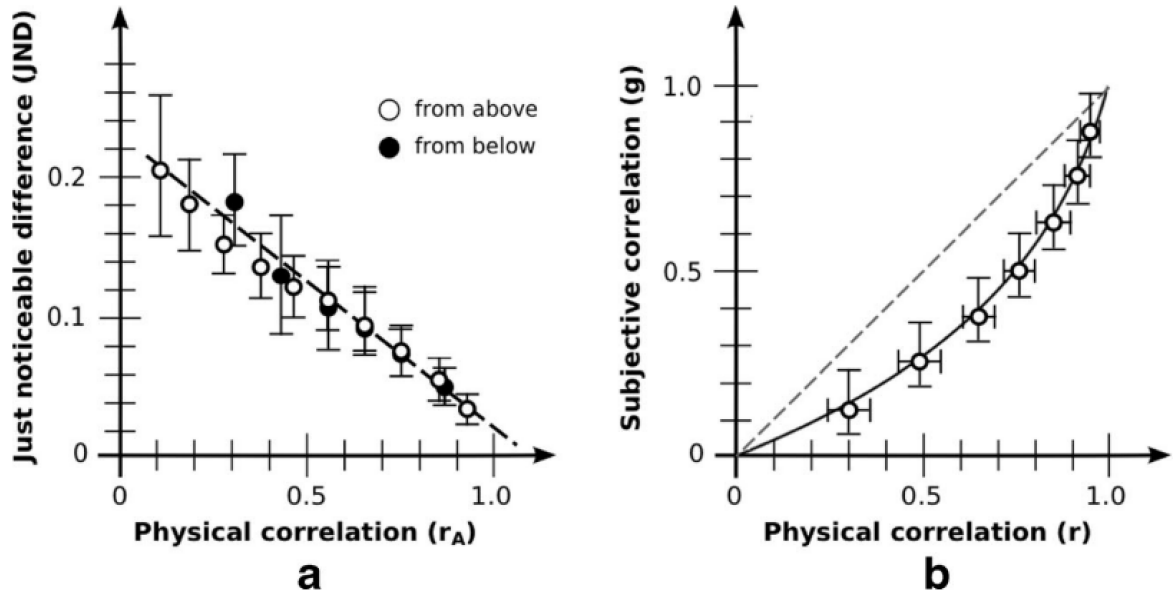
Scenario

1. 显示设备的变化
 - 屏幕->手机: 变小
 - 屏幕->大屏: 变大
 - 实验设计是否考虑不同设备?
2. 显示区域的变化
 - 从缩略图展开
 - 放大选取的区域
 - 实验设计中是否体现? (增加外围的干扰点)
3. 缩放方式
 - 等比缩放
 - 仅缩放坐标轴和点的位置, 不改变点的其他属性(半径, 颜色)
 - 有没有引用来论述这些方法?

Tasks

1. density
 - "Mechanisms for perception of numerosity or texture-density are governed by crowding-like effects"
 - at low number: numerosity mechanisms
 - at high numerosities: texture-density mechanisms
 - 因此存在拐点?
2. characterize distribution: seperate clusters/classes
 - 如何定义/设计实验?
 - "A Taxonomy of Visual Cluster Separation Factors"
 - "Visual quality metrics and human perception" 中有相关实验
3. identify outlier/anomalies
4. correlation

- 常规的correlation检测方法, 通过JND推出主观和客观之间的关系("The perception of correlation in scatterplots")



(图来自"The nature of correlation perception in scatterplots")

- Weber law一般仅用于low-level physical stimuli, 但却能在correlation上很好的运用, 一些工作试图找到其中的原因
 - based on perception of entropy ("The nature of correlation perception in scatterplots")
 - visual features as proxy ("Correlation Judgment and Visualization Features: A Comparative Study")

5. object-oriented? (identify/locate/compare object)

6. search for known motif (cluster/correlation/...)

- 看起来和我们的场景很有关联
- 是否可以设计实验?
- 能够引出哪些猜想?
- 找相关文献(具体定义, 使用场景, 测试方法)
- motif
 - locally similar scatterplot segments

hypotheses

1. display size 对 density/cluster/class/outlier/correlation等的感知有影响

- 正相关/负相关, 或者其他描述? | 论证

2. marker size 对各种感知有影响 / 可以被用于修正感知偏差

- 确定实验目标/变量
- 文章表述: *marker size vs. point radius*

3. density 与 marker size 的关系

- 非线性
- 正相关 or 存在拐点/极值
- 收敛
- 论证

4. correlation 与 marker size 的关系

- 非线性
- 存在拐点/极值
- 论证
- 与 density perception 的关联性
 - "Density in scatterplots and the estimation of correlation"
 -

5. outlier 与 marker size 的关系

- 非线性
- 存在拐点/极值
- 论证
- 与 density perception 的关联性

6. cluster 与 marker size 的关系

- 非线性
- 存在拐点/极值
- 论证
- 与 density perception 的关联性

7. search for known motif

- accuracy / time cost 与 marker size 有关

期望目标

- 从hypotheses的验证中找到 marker size -> density -> correlation / cluster / outlier 这样感知从低层向高层的关联性

其他发现

- 有很多visual quality metric/measure with perception的文章
 - "Visual quality metrics and human perception"
 - 用于度量 separation among clusters

- 做了一个实验找用户觉得最有区分度的投影(3类, 标注不同颜色, 这算cluster还是class?)及这些metrics是否和用户选择一致
- "Perception-based visual quality measures"
 - 针对高维数据投影的用户感知
 - 可以被修改适用于各种不同tasks
 - 用户实验针对不同task(seperation/correlation)有不同设计, 包括无监督和有监督(给一个样例)的二选一
- ~~"Perceptual visual quality metrics: A survey"~~
 - 图像处理方面的

7.31 总结

1. 整理了整体思路
2. 整理了相关论文, 下一步做出一个完整的列表(.xlsx)
3. 构建了latex项目(Git: https://github.com/bikvy/CHI19_paper.git) (由于是私有项目, 需要组)
4. 撰写了文章整体构架和一部分introduction

TODO

1. 思路整理做成PPT
2. 整理完整的论文列表, 包括名称、简介、重要程度
3. 继续撰写文章related work部分